

LSI LOGIC CORPORATION INVENTION DISCLOSURE FORM
(Mail to "Intellectual Property Law Dept. Attn: New Invention Disclosure" - Mail Stop AD-106)
Please attach additional pages where required

1. Title of the Invention:	Original	Number of Attached Pages:
Method and Apparatus for dual porting Serial ATA disk drives for use in a fault tolerant multi-initiated application		
If invention was presented in LSI "Brainstorming Session", please specify docket number assigned to you in reminder email -		
2. List of Inventors: (Please provide following - your name, email, phone and fax numbers)		
Bret S. Weber, bret.weber@lsil.com , [REDACTED] John V. Sherman, john.sherman@lsil.com , [REDACTED]		
3. Public Disclosure of the Invention:		
<ul style="list-style-type: none">▪ Was invention ever disclosed, either orally or in writing? If yes, please provide details, such as when and to whom. NO▪ Are there plans to disclose the invention in the future? If yes, please provide details, such as when and to whom. NO		
4. Use of the Invention:		
<ul style="list-style-type: none">▪ Has invention been used? If yes, please provide details, such as when and how. NO▪ Are there any plans to use the invention in the future? If yes, please provide details, such as when and how. [REDACTED]		
5. Invention "offered for" or "on sale":		
<ul style="list-style-type: none">▪ Was a product/process containing invention "offered for sale" or "sold"? If yes, pl. provide details, such as when & to whom. NO		
6. Date of your Invention:		
<ul style="list-style-type: none">▪ Specify the earliest date when you conceived of your invention: (e.g. the conception date) [REDACTED]▪ Specify the earliest date a prototype of the invention was built: (e.g. reduction to practice) [REDACTED]		
7. Background of the Invention: (please attach additional pages)		
<ul style="list-style-type: none">▪ The field to which your invention pertains. Storage Systems▪ The problems that your invention aims to solve. Attached▪ Existing approaches toward solving those problems (if any). Attached▪ What are these existing approaches lacking? Attached		
8. Detailed Description of Your Invention: (please attach additional pages)		
<ul style="list-style-type: none">▪ Provide enough information and detail so that another person in your field could make and use your invention.▪ If available, provide description with any existing reports, presentations, e-mails, sketches, drawings, schematics, photos, etc.▪ At least one simple Figure or Flowchart of your invention MUST be included. Attached▪ Identify the new features of your invention. Attached▪ List the advantages of your invention. Attached▪ Disclose alternate ways of making and using of your invention. Attached		
9. Prior Art: List only those patents, products, processes, journal articles, presentations, conferences, seminars, and other knowledge <u>that you are aware of</u> (you have no duty to conduct a search), that are related to the subject matter of your invention: None		
10. Customer/Vendor Contracts:		



LSI LOGIC CORPORATION INVENTION DISCLOSURE FORM
(Mail to "Intellectual Property Law Dept. Attn: New Invention Disclosure" – Mail Stop AD-106)
Please attach additional pages where required

- Was invention developed during performance of a customer/vendor contract? If yes, please provide details. NO

11. Government March-In Rights:

- Was invention conceived during performance of government contract? If yes, please provide details. NO

12. Signatures:

I/We the aforementioned inventor(s) of this invention, which was developed during the course of employment, submit in confidence this invention disclosure to attorneys of the LSI Logic Legal Dept. for the purpose of obtaining a legal opinion and/or advice as to availability of patent, trade secret, and/or copyright protection related to the material contained within.

I(We) believe myself(ourselves) to be the first and original inventor(s) of this invention:

Inventor (s)

Date: [REDACTED]

Buff & Lee
John V Sherman

Two Witnesses who have read and understood this invention disclosure:

Full Name of Witness (Print and Sign Name)

Date: [REDACTED]

Jason M Stuhlsatz

Jason M Stuhlsatz

Mark A Thorne

Mark A Thorne

BEST AVAILABLE COPY

LSI LOGIC CORPORATION INVENTION DISCLOSURE FORM
(Mail to "Intellectual Property Law Dept. Attn: New Invention Disclosure" - Mail Stop AD-106)
Please attach additional pages where required

In fault tolerant Storage Applications, multiported fault tolerant interfaces are typically used such as Fibre Channel. Due to the extremely high cost of fibre channel disk drives, it is highly desirable to use lower cost Serial ATA disk drives. These SATA drives, however, are inherently single ported, which introduces a single point of failure. In addition they are designed for a single master, point to point application. Existing approaches either continue to use fibre channel drives, or live with the potential of a failure reducing data availability.

This invention consists of a disk drive canister board that contains a circuit which has two inputs for two SATA Master devices to connect to. It has one output which then connects to a SATA disk drive. In addition, there is a provision for a dedicated control signal for switching the multiplexer function that can be used if desired. Ideally, in the preferred embodiment, this would be combined in an ASIC device. This device has several functions.

- 1) It provides Multiplexing of the SATA Masters to the Disk Drive guaranteeing that only one master is enabled at any one time.
- 2) It provides a method to allow idle characters to continue to flow to the disk drive.
- 3) It provides synchronization to transition idle character switch in from either master.
- 4) It provides idle detection from the masters and can auto switch based on the presence or absence of idles from a master.
- 5) Alternately, if both masters are enable permanently, it uses the external control signal to transparently switch over the idle streams from the desired master to the disk drive.

This invention allows two modes of operation.

- 1) The masters are controlled at a higher level to guarantee that only one board's serial transceivers are enabled at any one time. This allows the autodetect mechanism in the invention to determine which source to mux.
- 2) The masters are enabled all of the time, and the control signals are controlled at a higher level to guarantee that only one master is talking to the drive at any one time. The invention then provides synchronous switch over capability to eliminate delays in resynching.

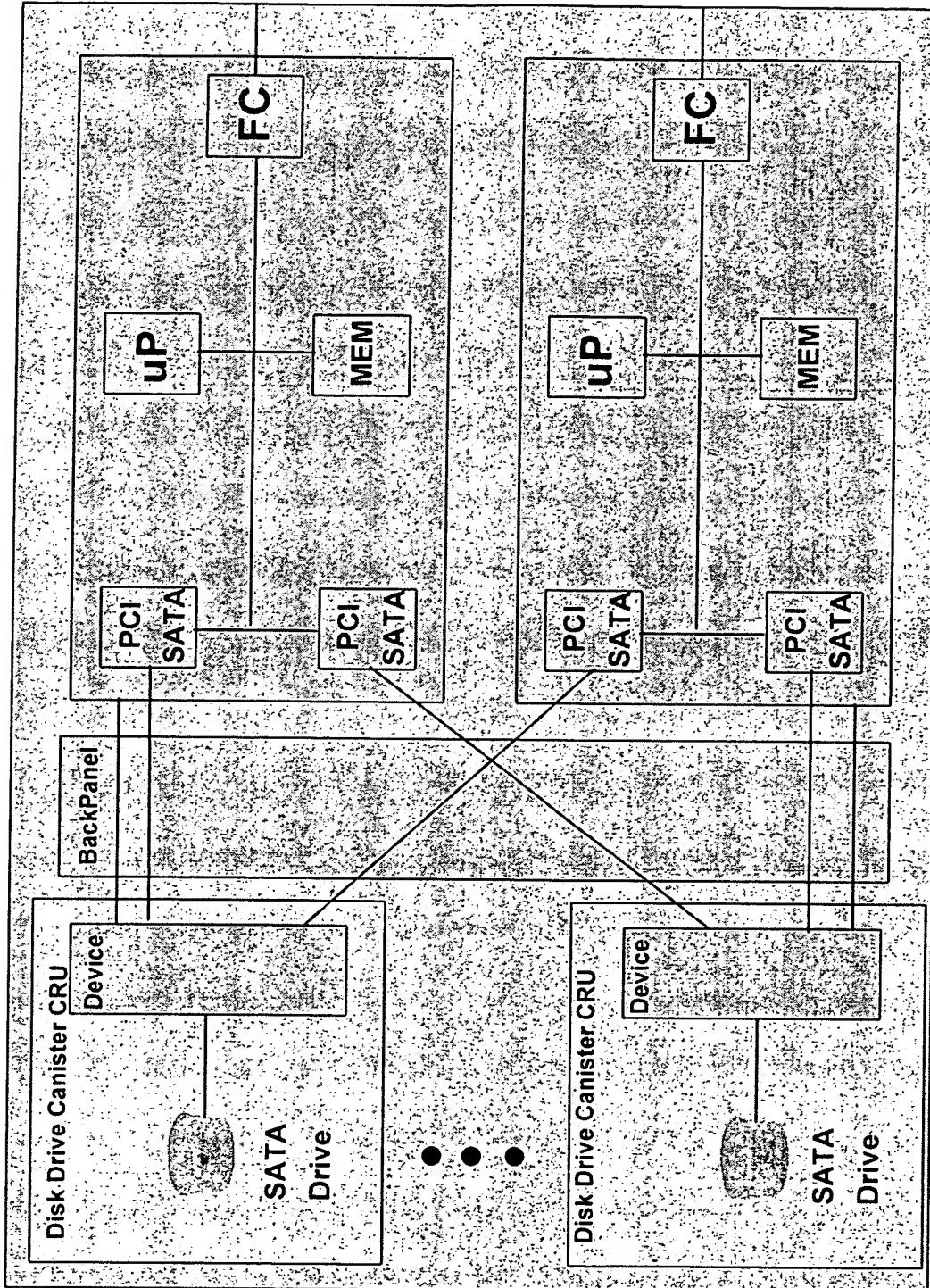
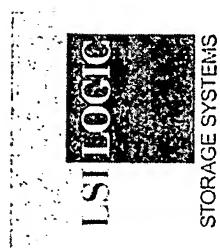
This invention effectively dual ports the SATA disk drive, when coordinated with complete command boundary coordination by an upper level entity. Since the circuit would be kept in the replaceable drive unit, it would be replaced with the disk drive in a failure scenario.

BEST AVAILABLE COPY

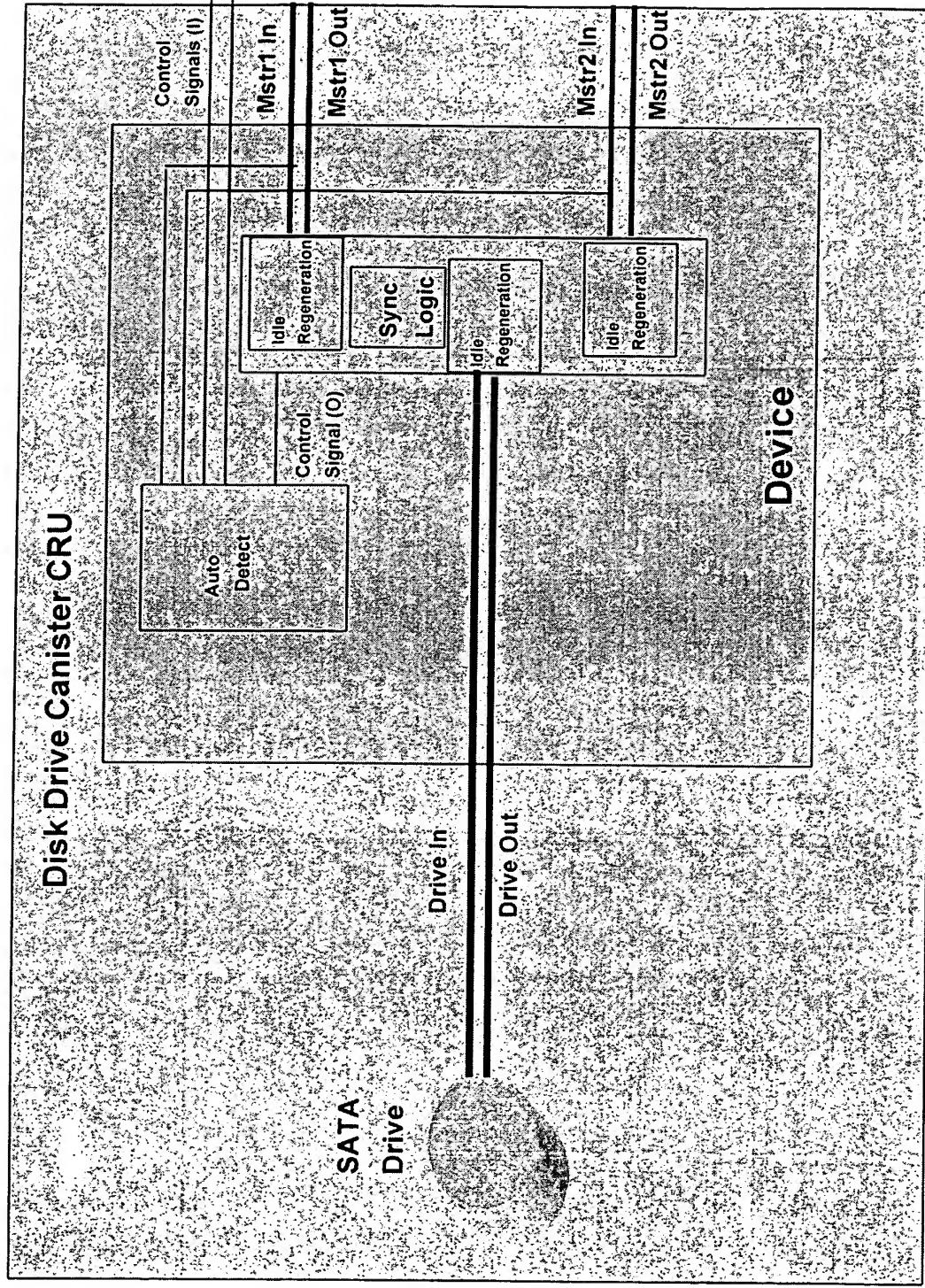
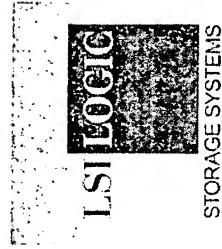
Disk Drive Cost Comparison "Retail" - from web sites

Capacity (GB)	RPM	I/F	Cost (from web)	\$/GB "Retail"	Vendor
60	5400	UATA/100	\$ 179.95	\$ 3.00	Maxtor
100	5400	UATA/100	\$ 299.95	\$ 3.00	Maxtor
20	7200	UATA/100	\$ 109.95	\$ 5.50	Maxtor
60	7200	UATA/100	\$ 199.95	\$ 3.33	Maxtor
20.4	5400	UATA/100	\$ 95.00	\$ 4.66	Seagate
30.6	5400	UATA/100	\$ 105.00	\$ 3.43	Seagate
40.8	5400	UATA/100	\$ 125.00	\$ 3.06	Seagate
60	5400	UATA/100	\$ 199.00	\$ 3.32	Seagate
80	5400	UATA/100	\$ 287.00	\$ 3.59	Seagate
20.4	7200	UATA/100	\$ 111.00	\$ 5.44	Seagate
30.6	7200	UATA/100	\$ 135.00	\$ 4.41	Seagate
40.8	7200	UATA/100	\$ 160.00	\$ 3.92	Seagate
18	15000	SCSI, FC	\$ 375.00	\$ 20.83	Seagate
36	7200	SCSI	\$ 415.00	\$ 11.53	Seagate
180	7200	SCSI	\$ 1,700.00	\$ 9.44	Seagate
36	10000	SCSI	\$ 485.00	\$ 13.47	Seagate
36	10000	FC	\$ 499.00	\$ 13.86	Seagate
73	10000	SCSI	\$ 875.00	\$ 11.99	Seagate
73	10000	FC	\$ 899.00	\$ 12.32	Seagate

Enclosure Example



Canister Example



BEST AVAILABLE COPY

